TOWN OF MASHPEE

Joyce M. Mason
Town Manager

René J. Read
Assistant Town Manager

March 9, 2009

Ms. Karen Pelto
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: Natural Resources Damages Fund/Groundwater Restoration Projects/Textron Settlement
Subj.: Town of Mashpee Grant Application

Dear Ms. Pelto,

Enclosed herein please find the Grant Application from the Town of Mashpee submitted under the Natural Resource Damages Fund, Groundwater Restoration Projects, Textron Systems Corporation/Mass Military Reservation Superfund Site grant program.

We are pleased to submit this application in response to the Request for Proposals and are excited by this grant funding opportunity since it is so closely aligned with Mashpee's overall water quality goals and objectives.

In addition to the Project Narrative, Budget Narrative and other requisite application materials, you will find a letter drafted jointly between the Town of Mashpee and the Town of Sandwich and a second letter drafted by the Towns of Mashpee, Sandwich, Falmouth and Bourne supporting each of our projects. We hope that these letters will serve as evidence of Mashpee's continued strong support for these types of projects on both a regional and sub-regional basis.

If you have any additional questions, please do not hesitate to contact me. Thank you for your attention to this request and we look forward to hearing from you.

Sincerely,

Joyce M. Mason

Joyce M. Mason
Town Manager
Town of Mashpee, MA

Enclosures

16 Great Neck Road North • Mashpee, MA 02649-2528
Ph: 508-539-1400 x 510 • Fx: 508-539-1403 • jmason@ci.mashpee.ma.us • rread@ci.mashpee.ma.us

Natural Resource Damages Fund
Groundwater Restoration Projects
Textron Systems Corporation/Mass Military Reservation Superfund Site

Project Proposal Form

APPLICANT AND PROJECT INFORMATION.

Type of Entity Check the box that best describes the applicant.

[ ] Private individual
[ ] Non-profit organization
[ ] State government
[ ] Federal government
[ ] Tribal government
[X] Municipal government
[ ] Corporation or Business
[ ] County government
[ ] Academic Institution
[ ] Other (explain)

Authorized Representative of Applicant

Joyce Mason
Name

Town Manager
Title

16 Great Neck Road North
Address

Address

Mashpee | MA | 02649
City | State | Zip

Phone: 508-539-1400 Ext. 513

Email: jmmason@ci.mashpee.ma.us

Contact Person (if different)

Rene' J. Read
Name

Assistant Town Manager
Title

16 Great Neck Road North
Address

Address

Mashpee | MA | 02649
City | State | Zip

Phone: 508-539-1400 Ext. 572

Email: rread@ci.mashpee.ma.us

Project Name Provide a brief working name:

Santuit Pond Diagnostic Study

Project Location

Attach an 8.5 x 11-inch map or copy of an aerial photograph showing project location and extent. Include pertinent topographic and geographic information, a scale, and north arrow.

Municipality/ies, State(s): **Mashpee, Massachusetts**

Restoration Priority Categories

Check all relevant boxes.

[ ] Protect quality of current drinking water supply
[ ] Protect quantity of current drinking water supply
[X] Protect quality of potential drinking water supply
[ ] Protect quantity of potential drinking water supply
[ ] Offset to mitigate impacts to water-dependent ecosystems

List Specific Injured Natural Resources and/or Impaired Natural Resource Services to Benefit from Project

Specific injured natural resources and/or impaired natural resources to benefit from this project include but are not limited to bathing beaches; freshwater shellfish; Eastern Box Turtles and a variety of freshwater fish species including Largemouth Bass, Chain Pickerel, Yellow Perch, Pumpkinseed, White Perch, Alewife and Bullhead Catfish the last of which were shown in a recent USGS report to have developed papilloma tumors.

Project Type Check all relevant boxes.

[X] Aquifer protection
[ ] Aquifer recharge
[X] Protection of environmentally sensitive lands or critical habitats
[ ] Water conservation
[X] Integrated water and wastewater management

Authorized signatory for the applicant organization: Joyce M. Mason **Date:** March 6, 2009

Natural Resource Damages Fund
Groundwater Restoration Projects
Textron Systems Corporation/Mass Military Reservation Superfund Site

TOWN OF MASHPEE
GRANT OPPORTUNITY INFORMATION
PROJECT NARRATIVE

Project Abstract:

Mashpee's economic viability and quality of life rely upon the quality of our groundwater resources, as reflected in drinking water quality and in surface water bodies that attract summer visitors and enhance tourism-related activities. To protect both, the Town is developing a wastewater facilities plan primarily focused on nitrogen TMDLs established for Popponesset and Waquoit Bays. However, we also face excessive levels of nutrients in fresh water bodies. Diagnostic studies of Ashumet Pond determined that effluent plumes from MMR's wastewater plant caused excessive phosphorus in that pond, which was then treated under the Base cleanup effort. Santuit Pond, a 164 acre shallow groundwater-fed pond, suffers from even higher levels of nutrient over-enrichment, and is listed in the Clean Water Act "Massachusetts Integrated List of Waters" in Category 5 (Waters Requiring a TMDL). Pollutants needing a TMDL (Total Maximum Daily Load) are nutrients and noxious aquatic plants. However, no diagnostic studies have been done to determine the sources of the Pond's nutrient overload. Through this grant, the Town seeks funding for a diagnostic study by ENSR Corporation (already procured) that will characterize and quantify nutrient inputs to the pond; define the TMDL value allowable to achieve a primary contact use designation; and recommend remedial activities to achieve the TMDL. Identifying the sources of nutrient enrichment will aid in future practicable management decisions to reverse the ecological degradation of the pond, as evidenced by its Clean Water Act 303(d) listing. ENSR projects a 12-14 month schedule at a cost of $58,825.

Site Description:

Santuit Pond, a 164 acre shallow kettlehole pond, is a major groundwater-fed surface water resource located within the Town of Mashpee, in Barnstable County, Massachusetts (*Please see attached map entitled "Figure 1, Santuit Pond, Mashpee, MA" and "T-8 Well Site."*) Santuit Pond provides important recreational and ecological features to the local residents. There is a public access at the northwest side of pond, with fishing, boating, and swimming as popular pursuits. These recreational uses have been impaired by the early onset and persistence of nuisance algal booms that cloud and taint the waters and recent outbreaks of potentially toxic cyanobacteria that have resulted in closures for swimming. Also located adjacent to the north end of the pond is the proposed T-8 public water supply well site.

Santuit Pond has a predominantly wooded watershed with moderate shoreline development on the west and northeast sides of the pond. The pond is a primarily groundwater fed natural basin with an intermittent stream inlet originating from a wetland and cranberry bog at its northwest corner, as well as man-made connections to active and abandoned cranberry bogs along its eastern and southern shores, occasionally used for flooding the bogs or returning bog water to the Pond. Local soils are sandy and gravelly. The maximum depth is 2.7 meters (m) with an average depth of 1.2-1.5 m and the pond does not undergo seasonal thermal stratification. The pond has a slow flushing rate of about 2 to 5 times per year. The primary pond outlet connects to the Santuit River and then eventually to Popponesset Bay, but water has also been historically routed to downstream cranberry bogs located in the lower half of the basin.

Santuit Pond is a well-fertilized (i.e., eutrophic) pond with characteristic high phosphorus concentrations, dense aquatic vegetation growth, and cyanobacteria blooms. It is a Category 5 water body (requiring a TMDL) on the "Massachusetts Integrated List of Waters" for nutrients and noxious aquatic plants. The pond has a low transparency level well below the State Sanitary Code guidance criterion of 1.2m (4 ft) for swimming. The phosphorus concentrations measured in 2001-2006 ranged from 17.34 to 83.6 ug/L (i.e., parts per billion), which is very elevated considering the Cape Cod Commission regional phosphorus criterion of 10 ug/L. There has also been a historical trend of increasing eutrophication, evident by comparison with water chemistry data from the 1980's which indicated the pond was moderately-fertilized (i.e., mesotrophic), as well as more recent restrictions on summer swimming activities.

According to an August 1987 study, Potamogeton robbinsii (Robbin's Pondweed) and Elodea canadensis (Waterweed) were the dominant aquatic plant species and are common in nutrient rich waters. The phytoplankton community is composed of green algae and cyanobacteria (a.k.a. blue-green algae). Species of Anabaena and Microcystis cyanobacteria can produce neurotoxins and liver toxins and have been found in the pond in bloom conditions. In spite of not being stratified, dissolved oxygen does drop near the bottom likely due to oxygen demand from decomposers, which is indicative of a highly productive water body and might facilitate the recycling of phosphorus from bottom sediments. The Bryant's Neck portion of the pond has also been plagued with high E.coli bacterial counts in recent years.

Santuit Pond is a productive Cape Cod warm water fishery that provides an active recreational fishery. This pond was last surveyed by the Massachusetts Division of Fish and Wildlife (MA DFW) in 1998, at which time the following species were present: largemouth bass, chain pickerel, yellow perch, pumpkinseed, golden shiner, brown bullhead, white sucker, white perch, alewife, and American eel.

Project Goals and Objectives:

As previously noted in the Abstract section of this proposal, Mashpee's economic viability and quality of life rely upon the quality of our groundwater resources, as reflected in drinking water quality and in surface water bodies that attract summer visitors and enhance tourism-related activities. To protect both, the Town is developing a wastewater facilities plan primarily focused on nitrogen TMDLs (Total Maximum Daily Load) established for Popponesset and Waquoit Bays. However, we also face excessive levels of nutrients in fresh water bodies. Diagnostic studies of Ashumet Pond determined that effluent plumes from MMR's wastewater plant caused excessive phosphorus in that pond, which was then treated under the Base cleanup effort. Santuit Pond, a 164 acre shallow groundwater-fed pond, suffers from even higher levels of nutrient over-enrichment, and is listed in the Clean Water Act "Massachusetts Integrated List of Waters" in Category 5 (Waters Requiring a TMDL). Pollutants needing a TMDL are nutrients and noxious aquatic plants. However, no diagnostic studies have been done to determine the sources of the Pond's nutrient overload. Through this grant, the Town seeks funding for a diagnostic study by ENSR Corporation (already procured) that will characterize and quantify nutrient inputs to the pond; define the TMDL value allowable to achieve a primary contact use designation; and recommend remedial activities to achieve the TMDL. Identifying the sources of nutrient enrichment will aid in future practicable management decisions to reverse the ecological degradation of the pond, as evidenced by its Clean Water Act 303(d) listing.

The Town of Mashpee recognizes the existence of scientific data generated from past studies and in support of the Massachusetts's Estuaries Project such as residence times, watershed delineations, laboratory analyses, etc. Under this proposal, ENSR Corporation shall acquire the data from the original source and supplement it with actual data generated from field sampling activities designed to provide an accurate quantification of actual nutrient input conditions.

Based on the foregoing information, it is clear that Santuit Pond receives excess nutrients such that the pond's water quality does not support designated water uses. (Please see attached photos entitled "Figure 2 and Figure 3,

Santuit Pond, Mashpee, MA"). The ultimate goal of this project is to restore Santuit Pond to fully support primary contact and aquatic habitat uses. However, the nature and magnitude of the nutrient sources need to be better characterized with field sampling so that an effective watershed and pond restoration can be designed. Accordingly, the goals and objectives of this study are to:

- conduct a diagnostic study to document current conditions and that characterizes and quantifies the nutrient sources;
- develop hydrologic and nutrient budgets for Santuit Pond and provide water quality target goals for restoration that addresses TMDL requirements; and
- recommend lake and watershed remedial activities with estimated costs to improve water quality to support primary contact and aquatic habitat uses.

Completion of the diagnostic study and definition of the TMDL water quality target goals will allow Santuit Pond to be qualified to apply for Clean Water Act Section 319 restoration funding. The Clean Water Act Section 319 restoration funding refers to Clean Water Act (CWA) which Congress amended in 1987 to establish the section 319 Non-point Source Management Program because it recognized the need for greater federal leadership to help focus State and local non-point source efforts. Under section 319, State, Territories, and Indian Tribes receive grant money which support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific non-point source implementation projects. The study results and TMDL target will also be a direct input to the Mashpee Sewer Commission's ongoing development of a Comprehensive Water Resources Management Plan for the Popponesset and East Waquoit Bay watersheds. The Santuit Pond area is being specifically considered for early implementation of sewering pending determination whether septic systems west and northeast of the Pond are a significant source of phosphorus to the Pond. The Town can apply for zero interest State Revolving Fund (SRF) funds available to projects which are primarily intended to remediate or prevent nutrient enrichment of a surface water body. In addition, study results will clarify whether groundwater nutrient sources could have an adverse impact on the Mashpee Water District's proposed T-8 well located at the north end of the Pond. The T-8 well site is located approximately 330 feet north of the Pond on Town-owned property. A test well installed in 1987 indicated an estimated yield of 1 million gallons of water per day. The site is considered an excellent candidate for future development by the Mashpee Water District. Any information provided by the ENSR report regarding nutrient levels and sources in groundwater flowing to the north end of the pond will be helpful in determining the potential quality of water from the well and thus assist the District in determining whether to proceed with development of the well. (*Please see attached map entitled "T-8 Well Site."*) The Town of Mashpee is aware that a diagnostic study, no matter how carefully conducted, does not clean up a pond but it will however; be the first important step on the path to supporting the Section 319 grant applications and SRF loan applications which, with watershed stakeholder involvement and successful funding, will lead to restoration of Santuit Pond.

Project Tasks and Milestones:

☐ ***Identify to the best of your ability who will be performing each project task and whether the work will be done by the applicant organization or an external firm or group.***

The Town of Mashpee has procured the firm ENSR Corporation to perform the study of Santuit Pond. ENSR has provided the following information with regard to their team for this project:

The ENSR project team has years of experience completing water resources investigations in Massachusetts and an extensive project record in Cape Cod. These investigations have focused the full suite of physical and chemical parameters that are important to lakes, streams, rivers and groundwater. As such, these studies have led the team not only to an academic understanding of the Massachusetts water quality regulations and standards but also practical experience in applying the regulations and standards. Members of the ENSR team have worked on projects located in each of the major drainage basins in Massachusetts which gives them the understanding of the variability in surficial geology, ecoregions and climate throughout the state.

The ENSR team proposed for this investigation includes several widely respected limnologists, water quality scientists, and engineers. Key members of the ENSR team include Dr. David Mitchell, Dr. Ken Wagner, Ms. Wendy Gendron, and Ms. Sarah MacDougall. Brief biographical sketches of the key project team are presented below.

Dr. David Mitchell, a Senior Ecologist at ENSR with 23 years of lake assessment and restoration experience, will be the Project Manager for the Santuit Pond RFP project. Dr. Mitchell has been project manager for numerous major lake diagnostic/feasibility and implementation projects in New England, the Middle Atlantic States and Great Lakes regions. Recent projects on Cape Cod or in southeastern Massachusetts include: Ashumet Pond, Lovers Lake, Lily Pond, Mystic Lake, Red Lily Pond, and Stillwater Pond. He has authored technical articles and manuals for lake/pond management and presented workshops to state agencies, municipalities, and diverse watershed stakeholder groups. Dr. Mitchell is very familiar with the inter-related technical issues of water quantity and quality in New England waterbodies, and the potential ecological implications of watershed development. Dr. Mitchell has been extensively involved with developing the ecoregional database and potential application of nutrient criteria in New England for the NEIWPCC and EPA, including the concept of reach-specific nutrient criteria. He was a principal investigator for the USEPA-American Water Works Association Research Foundation (AwwaRF)- sponsored monograph on the control of water milfoil in drinking water reservoirs.

Dr. Wagner will be the Principal-in-Charge for the Santuit Pond diagnostic study. Dr. Wagner, the immediate past president of the North American Lakes Management Society, is a nationally recognized limnologist and phycologist and has worked closely in the past with state agencies throughout New England and USEPA Region 1 on hundreds of watershed and lake investigations. Dr. Wagner was the final editor for the General Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts, a publication available through the Massachusetts Department of Environmental Protection (MA DEP). Dr. Wagner's management skills, technical expertise, and attention to detail has gained him the respect and admiration of his peers over the years and exemplifies the mindset of ENSR's entire technical team. Dr. Wagner will be available for project oversight and technical consultation through the duration of the project.

Ms. Gendron is a project manager with more than 11 years experience in aquatic ecology. She holds a B.S. in Biology and has strong skills in lake assessment and nutrient TMDL development. She has performed and designed numerous diagnostic feasibility studies, which have included physical, chemical and biological assessment. Her experience includes the development of numerous lake and watershed management plans. Her experience also includes design and oversight of in-lake and watershed management implementation including alum treatments, plant harvesting, planting, herbicide application, and watershed controls. She has authored and presented numerous papers at international symposia on lake and watershed management. Ms. Gendron is a Certified Lake Manager through the North American Lake Management Society.

Ms. Sarah MacDougall holds a B.S. in Environmental Science from the University of New Hampshire and an M.S. in Water Resource Management from the Pennsylvania State University. She is an environmental scientist specializing in watershed/lake management, storm water management, and wetland ecology. Her work in watershed and lake management includes aquatic plant surveys, in-lake water quality sampling, and phosphorus TMDL development. She has also assisted with the field sampling and report writing of diagnostic/feasibility studies of phosphorus rich lakes and work on several Cape Cod lakes including Long Pond, Lovers Lake, Mystic Lake and Stillwater Pond. Prior to her experience in environmental consulting, she managed a long-term monitoring program of acid-impaired streams in Pennsylvania as a research assistantship while pursuing a master's degree in water resource management.

As ENSR noted in their proposal submitted in response to the Town's Request for Qualifications, their staff have performed several hundred diagnostic/feasibility studies and watershed restoration projects under Federal and State Clean Lakes Programs and for public and private clients. For these projects ENSR has provided expertise in complete physical, chemical and biological evaluation of the waterbody and its watershed and facilitated informed management decisions based on sound science. ENSR has explained that they typically perform these projects from initial problem definition to management program implementation, while stressing the need to balance in-lake

and watershed management measures in a cost-effective manner. ENSR has stated to the Town of Mashpee that "both the needs of human users and habitat features are given careful consideration in our studies, and we blend scientific approaches with economic, social and regulatory constraints to develop workable solutions to lake and watershed problems."

- ***Describe the methods or approaches to be used to conduct the project tasks and describe how these methods or approaches have been used successfully to achieve similar restoration benefits.***

Following a qualifications-based proposal review and interview process, ENSR was chosen as the Town's consultant for the Santuit Pond Study. As ENSR noted in their proposal submitted in response to the Town's Request for Qualifications, their project approach and defined scope of work are as follows:

The Santuit Pond diagnostic study will address a very common issue for many Cape Cod kettlehole ponds - the pervasive influence of NPS-derived nutrients entering the waterbody from groundwater and elsewhere. This project will require source characterization of both surface and groundwater inputs, aquatic vegetation and sediment surveys, lake modeling to establish target of nutrient load reduction to restore water quality uses, and an evaluation of the potentially feasible pond restoration techniques. ENSR has indicated that they will be bringing these elements of water quality assessment, lake and TMDL modeling, watershed characterization and restoration identification into their approach to this project.

As evidenced by the failure of Santuit Pond surface water to meet Massachusetts water quality standards, it is clear that it will be necessary to take a comprehensive look at potential sources. While there is potential concern regarding the nutrients and/or bacteria entering the lake via groundwater, the well-developed shoreline on the west and proximity of homes (e.g., Bryant's Neck) is also a potential source. Erosion due to the steep neighboring slopes and potential sediment runoff may also provide nutrients. Wildlife and atmospheric deposition can be load sources. Finally, the low dissolved oxygen concentrations observed near the pond bottom suggests internal phosphorus recycling may be occurring. Therefore, the first step is a comprehensive assessment of Santuit Pond and its watershed to identify the most important nutrient load sources. Based on this assessment, ENSR will conduct a TMDL-like assessment of Santuit Pond, using the same methodology and tools that ENSR has employed for numerous other TMDLs.

Using a combination of our site-specific measurements of surface water chemistry, groundwater seepage and chemistry, and sediment characterization, as well as use of watershed land use models (MASS GIS maps), refined export coefficients, estimation of septic system contributions from the 300 ft buffer zone, precipitation patterns, and empirical in-lake models, ENSR will be able to identify likely sources and/or watershed areas, assign relative importance, and discuss those that may warrant further investigation. ENSR will develop an approximate phosphorus budget that results in the observed water chemistry data including the potential contribution from internal recycling.

Using these data and those from other Cape Cod lakes that ENSR is presently developing TMDLs for, we will be able to select and justify the amount of phosphorus load reduction that would be need to restore the pond's designated water quality uses. Once these target phosphorus goals have been established, it will be necessary to find where this reduction could be implemented. ENSR has developed a template for lake TMDLs for New England and the Santuit Pond results will be presented in a format that satisfies the requirements of a TMDL. Additionally, based on the amount of phosphorus reduction necessary for pond restoration, ENSR will identify and evaluate what potential restoration or remediation options are scientifically sound, technical feasible, environmentally permissible, and cost-effective. ENSR will also identify potential funding sources for these alternatives.

Finally, ENSR has indicated to the Town of Mashpee their clear understanding of the importance of getting watershed stakeholder input and consensus regarding pond restoration objectives, methods, and timetables. As such, during the course of the project, the general public will be informed of the project objectives, progress and results through informational meetings.

For the assessment, ENSR will conduct a series of field surveys to identify the major sources of nutrients to Santuit Pond. This will involve four rounds of surface water quality sampling, two rounds of groundwater sampling, sediment characterization, and aquatic vegetation mapping. ENSR will identify and characterize the nutrient sources causing eutrophication of Santuit Pond, generate hydrological and nutrient budgets, summarize conditions in a diagnostic summary, and assess potential restoration techniques. The consultant will hold initial and final public informational sessions. This scope of work will be completed as a series of task and sub-tasks, as detailed below.

1 a. Review Available Data

ENSR has already reviewed much of the historic water chemistry and physical data (DWPC, 1983; DEQE, 1989; CCC, 2003; MADEP & SMAST, 2006; MA DFW, 2007) available for the system, but they will seek out additional information that the Town of Mashpee, Mashpee Environmental Coalition (MEC), Bryant's Neck Association, or other entities may have and incorporate the additional information obtained into the diagnostic assessment. Relevant materials and data would be included as an appendix to the Diagnostic Study report.

1 b. Initial Meeting at Mashpee

ENSR will meet with the Town representatives (Conservation Commission, Conservation Department personnel, Town officials, etc.), watershed associations (e.g., MEC), and other interested stakeholders at an initial kickoff meeting to discuss Santuit Pond, its watershed, overall lake management objectives, and project details and coordination. The Town of Mashpee will seek inclusion of all interested parties at the same meeting, as this will be an important coordination step for all further project actions.

2 a. Quality Assurance Work Plan (QAWP) for Additional Data Collection

ENSR will prepare a Quality Assurance Work Plan (QAWP) to support all data collection and analysis activities within this project. ENSR has prepared many similar QAWPs previously and they take the general approach of establishing sound procedures and advancing data expectations at the start of a project, coupled with sufficient flexibility to deal with field operations meeting unexpected conditions.

2 b. Surface Water Chemistry

The historic data available are useful for trend analyses for Santuit Pond, but do not document current conditions nor distinguish between surface water and groundwater sources. Surface water chemistry and depth profiles of Santuit Pond will be measured four times during 2009 (e.g., April, late May, July, and September) at three locations near the public landing, in the deeper basin north of Bryant's Neck, and in the central area south of Bryant's Neck.

At each location, water quality samples will be collected for total phosphorus, dissolved phosphorus, nitrate-N, ammonium-N, total Kjeldahl nitrogen (TKN) and dissolved iron, alkalinity, and total suspended solids. Surface water will be sampled at all stations with bottom samples (taken 0.3 m off bottom) collected at the two central locations. Up to four samples will be used to characterize the water quality of flowing inlets. Approximately 28 surface water chemistry samples including QC samples are expected. ENSR anticipates using Berkshire Enviro-Labs of Lee, MA (a Massachusetts-certified laboratory) for the water chemistry and nutrient work.

Dissolved oxygen and temperature profiles, along with pH and specific conductivity, will be taken at two central basin locations at intervals of 1 meter, from the surface to the bottom of the pond. ENSR will also measure Secchi disk readings at these central sites and collect samples for chlorophyll a determination. Zooplankton will be sampled once during the late May field survey.

2 c. Ground Water Seepage and Chemistry

Ground water monitoring will be conducted in late May and September along the shoreline of Santuit Pond, and will include measurement of both quality and quantity of seepage. The pond shoreline will be divided up into representative segments, with segments in both upper and lower basin (i.e., above and below Bryant's Neck).

In each of up to six shoreline segments up to five discrete samples will taken be over the length of the segment along the shore using a littoral interstitial porewater sampler (LIP) following the methods of Mitchell et al. (1988, 1989). Samples from each segment will be composited into a single sample for the corresponding segment. The LIP sampler will be inserted into the sediment near the shoreline (underwater or on shore) to a depth of at least 6 inches. Porewater will then be extracted with the aid of a hand-operated vacuum pump and an intermediate fluid-trapping vessel. Field-measured pH and specific conductivity may aid in distinguishing between lake water and deep interstitial water. The composited samples will be analyzed for dissolved phosphorus, nitrate-N, ammonium-N, and dissolved iron. Approximately 14 groundwater chemistry samples, including QC samples, are expected.

Seepage meters will be used to determine the relative amount of groundwater movement into or out of the pond during the May and September surveys, applying the method of Mitchell et al. (1988). A seepage meter consists of an inverted 55-gallon drum section with an attachment for a plastic bag containing a known volume of water. Change in the initial volume of the water after a measured period of time was used to determine seepage per unit area. Extrapolation to the portion of the lake bottom covered with sand allows estimation of total seepage.

2 d. Sediment Characterization

A video survey of the sediments of Santuit Pond will be taken to determine the visual nature of the sediment substrate and to identify locations or depths where sandy, silty or organic muck sediments are present. The results of this survey will be used to create a sediment map of the pond. This information can be used to determine the lake area involved in sediment phosphorus regeneration, as well as oxygenated sediments contribute relatively little phosphorus to the internal load.

To evaluate the potential reservoir of phosphorus in the sediments, it will be useful to know how much phosphorus is bound in the upper few inches of sediment as this greatly affects release rates. The extractable phosphorus analysis will help determine the amount of available phosphorus as loosely-sorbed phosphorus and iron bound phosphorus, following the methods of Rydin and Welch (1998, 1999). ENSR will collect 3-4 sediment samples and analyze them for total solids, grain-size, total phosphorus, loosely bound (or labile) phosphorus, iron bound phosphorus, total aluminum total iron, percent solids). ENSR will use Spectrum Analytical of Agawam, MA for this specialized sediment analysis.

ENSR will update the existing aquatic vegetation map showing the coverage and density of aquatic macrophytes. The macrophyte species inspection will be conducted by visual inspection of Santuit Pond's littoral zone by boat using an underwater camera. Inspection may be supplemented by snorkeling and hand collection of specimens underwater, as needed. Presence of freshwater mussel species will also be noted in the survey transects.

ENSR will incorporate the information from Tasks 1 and 2 and develop hydrologic and nutrient budgets for Santuit Pond. Considerable effort has already been expended on the delineation of the groundwater flow patterns and recharge area in Santuit Pond as part of the Popponesset Bay TMOL Technical Report (MAOEP & SMAST, 2006). ENSR will use and expand upon that work using the pond-specific estimates of seepage for development of the hydrologic budget.

Using the same watershed land use data and using the methodology and models currently being used to produce TMDL load allocation estimates for USEPA New England, ENSR will calculate the present phosphorus load to the lake, calibrated to match the measured in-pond concentrations and trophic indicators

(e.g., chlorophyll and SOT). Based on the in-lake model, ENSR will provide a tabular and/or written description of the sources and their relative importance. Based on the hydrologic and nutrient budget, ENSR will establish potential water quality goals for improvement of Santuit Pond that will result in improved ecological and recreational functions for the Pond.

Additionally, ENSR staff will sample water quality during two wet weather events to better quantify these potential inputs to Santuit Pond due to non-point source runoff. This shore-based sampling will take up to 5 samples + 1 quality control sample (or 2 events x (5 + 1) = 12 water quality samples). Runoff near Lantern Lane and other residential areas will be targeted. Water quality parameters analyzed will include nutrients, TSS, bacteria, alkalinity, iron, and bacteria as well as field measurement of temperature, DO, pH, and specific conductivity. Also, ENSR staff will instruct local watershed volunteers to sample water quality from discharging cranberry bogs and estimate flow during drawdown of the adjacent bogs to better quantify these potential inputs to Santuit Pond due to non-point source runoff. This shore-based sampling will take up to 3 samples +1 quality control sample (or 2 discharge events x (3 + 1) = 8 water quality samples). Water quality parameters will include nutrients, TSS, bacteria, alkalinity, and iron as well as field measurement of temperature, DO, pH, and specific conductivity.

ENSR will compile the findings of the Santuit Pond Diagnostic Study into a draft report that describes and summarizes the results, documents the current conditions of the pond, characterizes the critical nutrient sources, and evaluates what potential restoration or remediation options are technical feasible and cost-effective. This information will be presented in a format that would make it directly applicable to development of a TMDL document.

The draft report will be distributed electronically to applicable Mashpee town agencies and officials, interested watershed stakeholders, and as a downloadable PDF file that can be placed on a web site for access by the general public. Following the diagnostic study presentation and receipt of public comments, the Santuit Pond diagnostic study will be finalized. The final diagnostic study will be provided as 3 hard copies, an electronic version, and a downloadable PDF file that can be placed on a web site for access.

ENSR will provide a presentation regarding the findings of the diagnostic study to applicable Mashpee town agencies and officials, interested watershed stakeholders, and the general public. ENSR will regularly communicate with Town officials regarding the status and progress of the Santuit Pond Diagnostic Study.

☐ ***Identify any planning, design or permitting activities that must be completed prior to project implementation, including the name or permit or approval, the name of the entity with authority to grant or deny the permit or approval, and the current status of the permit or approval (e.g., not yet applied, pending, granted, denied, under appeal).***

Since this grant proposal request is for the purpose of funding a previously procured study of Santuit Pond, there are no additional planning, design or permitting activities required at this time.

☐ ***Identify any property access agreements, easements, rights-of-way, or other agreements that will be needed to complete the project and outline how they will be obtained as part of project implementation.***

There are several public access areas to Santuit Pond thus; no access agreements, easements, rights-of-way, or other agreements will need to be executed in order to complete the project.

☐ ***Identify and characterize potentially beneficial or adverse short- or long-term environmental, social, and economic impacts of the proposed project***

1) There should be no potential short term environmental, social or economic impacts of the project. The only physical disturbance of the pond environment is limited to a) the collection of 3-4 sediment samples from the bottom of the pond, b) the collection of up to 30 groundwater samples along the shoreline of the Pond by inserting a littoral interstitial porewater sampler six inches into the sediment (underwater or on shore) and extracting groundwater with a hand-operated vacuum pump and c) the installation and temporary

maintenance of a number of seepage meters in the Pond during May and September. No disturbance of state-listed rare species or significant area of habitat will occur.

2) In the short term, beneficial impacts of the study primarily consist of the information that will be developed regarding nutrient sources and mitigation measures, which will provide direction to the Town's wastewater facilities plan and stormwater management efforts and the use of the study information as support for Section 319 grant and SRF loan applications for implementation measures.

3) In the long term, completion of the recommended implementation measures will benefit the pond environment by reducing or eliminating excessive nutrients and noxious aquatic plants and bacteria. That will, in turn, provide the social benefit of enhanced recreation opportunities in the Pond, most particularly in the elimination of the need for swimming closures and other health advisories. Both the elimination of noxious aquatic plants and their severe impact on the clarity of pond water, and the enhancement of swimming and other water-based recreational opportunities will provide the economic benefit of enhanced pond-front and nearby property values and municipal tax base.

☐ ***Describe measures that will be undertaken to ensure long-term effectiveness and sustainability, e.g. demonstrating that future land or other resource management activities will not disrupt areas or resources that will be restored and/or diminish the project's benefits.***

In order to achieve long-term reduction of pond nutrient and aquatic vegetation problems and sustainability of an improved pond ecosystem, based on the study results, the Town will a) develop wastewater collection and treatment facilities to service any residential development that is indicated as a source of nutrient enrichment of the Pond, b) install stormwater facility upgrades where street runoff from public ways is indicated as a nutrient source, c) design and conduct any in-pond remediation efforts recommended by the study, d) adopt any regulatory measures which may be appropriate to reduce phosphorus inputs from residential development and e) work with cranberry growers to implement any recommended measures regarding bog operations.

Project Schedule:

Our consultant has noted that they can adapt their proposed Scope of Work to work within either one or two calendar years. In the case of the former, all field tasks would be completed during one growing season (either 2009 or 2010); in the case of the latter, field sampling would start in the fall of 2009 and be concluded in the spring of 2010. ENSR has noted that they are flexible with regard to these choices and have conducted pond diagnostic/feasibility studies under both schedule regimes.

The project schedule is provided in the figure below and is an example of the timeline for completion of the project tasks as identified therein. The figure indicates the anticipated period to complete each task and the interrelationship of conducting and completing these tasks.

Task #	Description	Nov 2009	Dec'09-Mar'10	April 2010	May 2010	June 2010	July 2010	Aug. 2010	Sept. 2010	Oct. 2010	Nov. 2010	Dec. 2010
	Contract Initiation											
1.0	Data Review & Initial Meeting											
1.a	Review Available Data											
1.b	Initial Public Meeting											
2.0	Field Surveys											
2.a	QAWP Preparation											
2.b	Surface Water Chemistry											
2.c	Groundwater Seepage & Chemistry											
2.d	Sediment Characterization											
2.e	Aquatic Vegatation Survey											
3.0	TMDL Analysis											
4.0	Diagnostic Summary Report											
5.0	Final Meeting											

Figure 1. Santuit Pond, Mashpee, MA

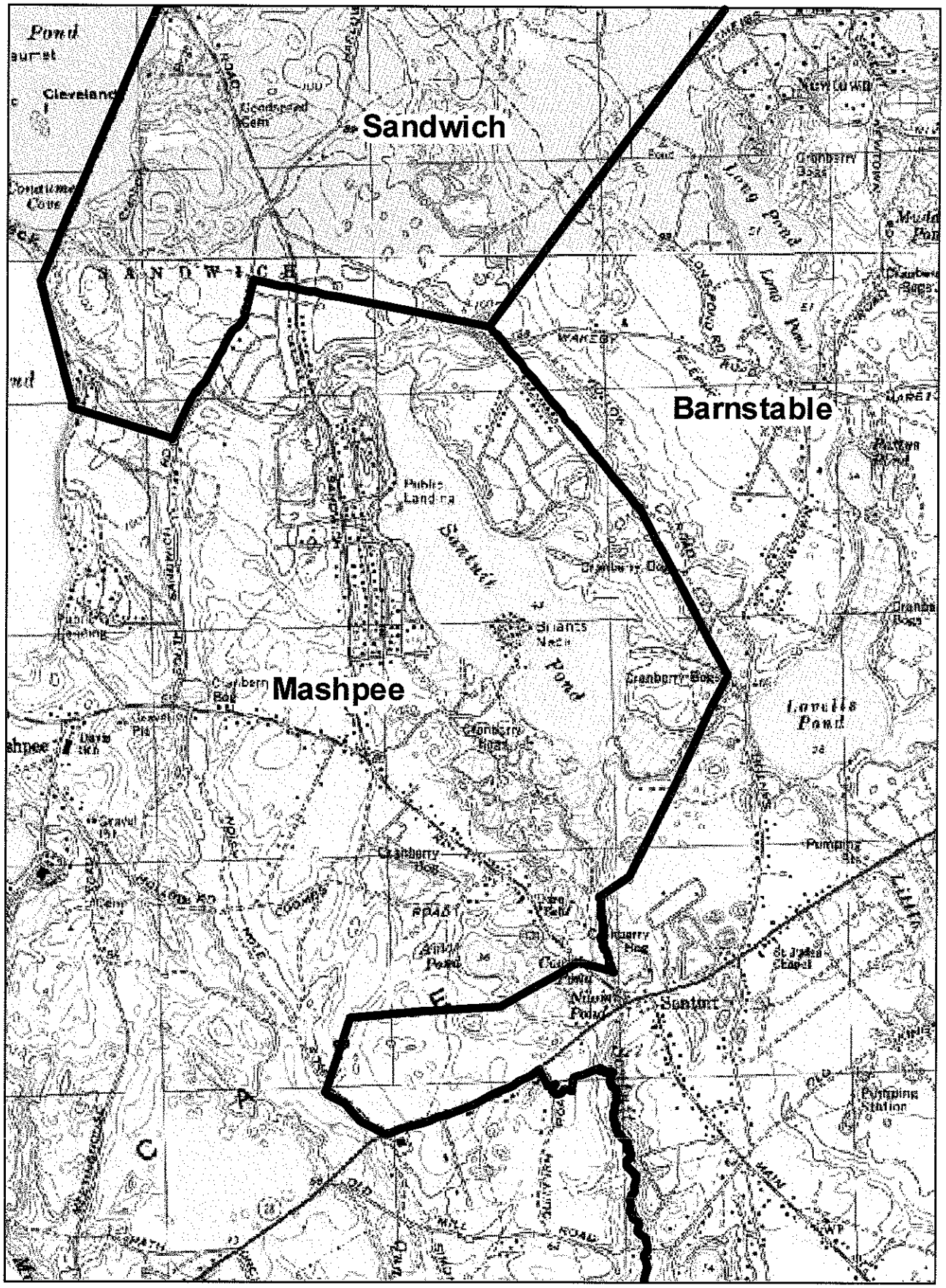


Figure 1 - Location Map
Santuit Pond
Mashpee, Massachusetts

Scale
1:24,000

T-8 WELL SITE

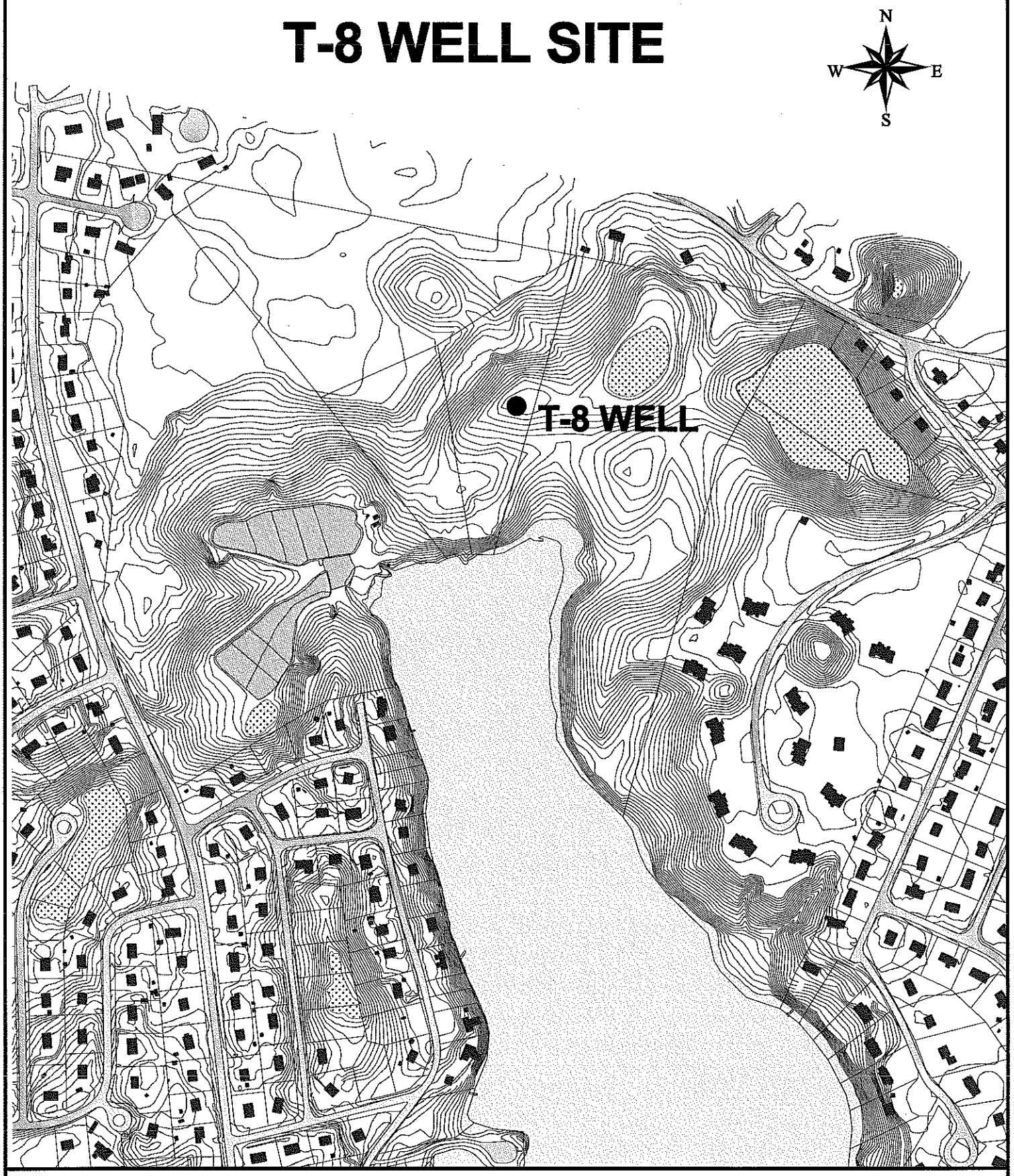

N
W
E
S
T-8 WELL
200 0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 Feet

Figure 2 Santuit Pond, Mashpee, MA

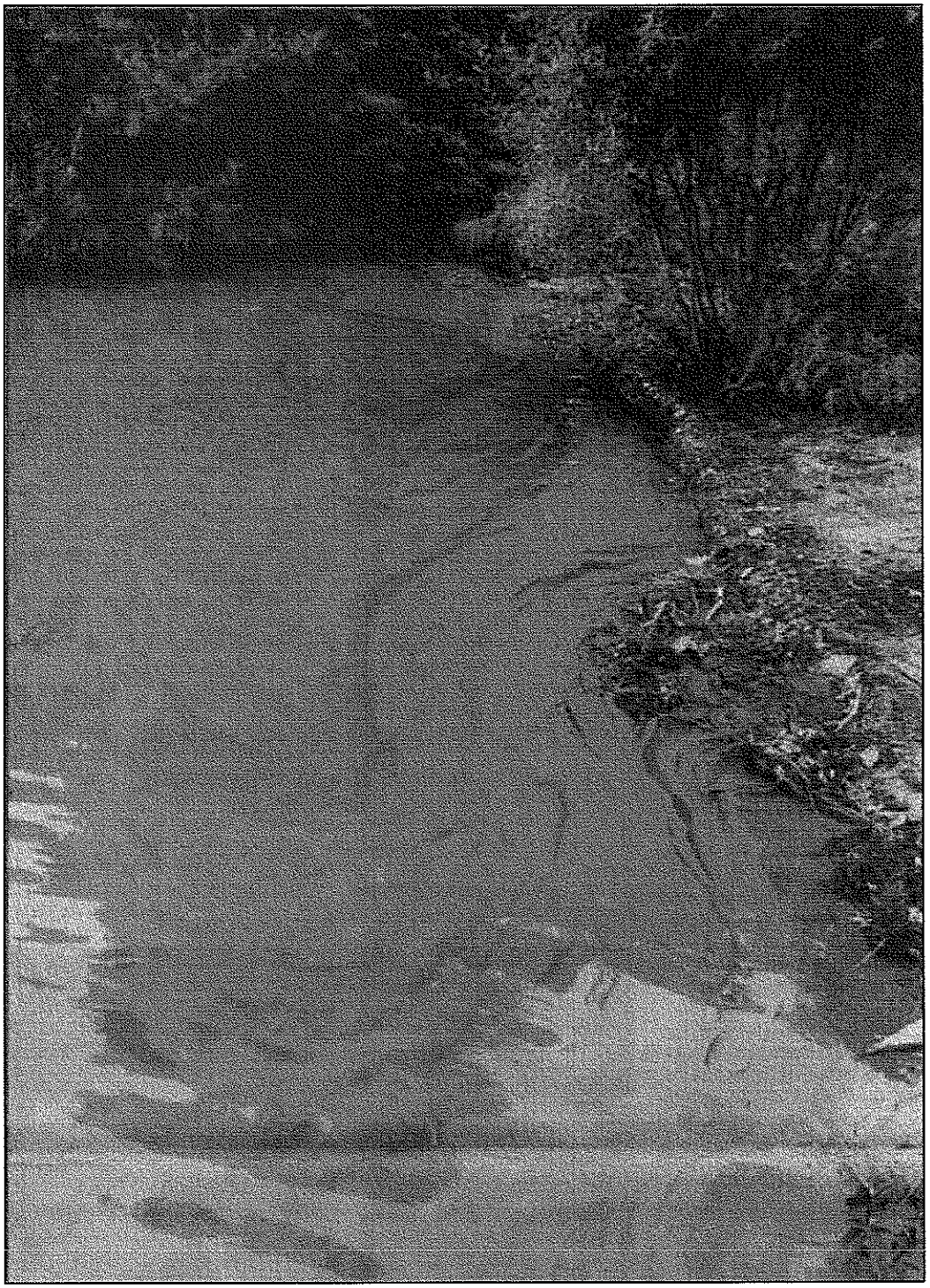


Figure 2
Santuit Pond
Mashpee, Massachusetts

Figure 3 Santuit Pond, Mashpee, MA

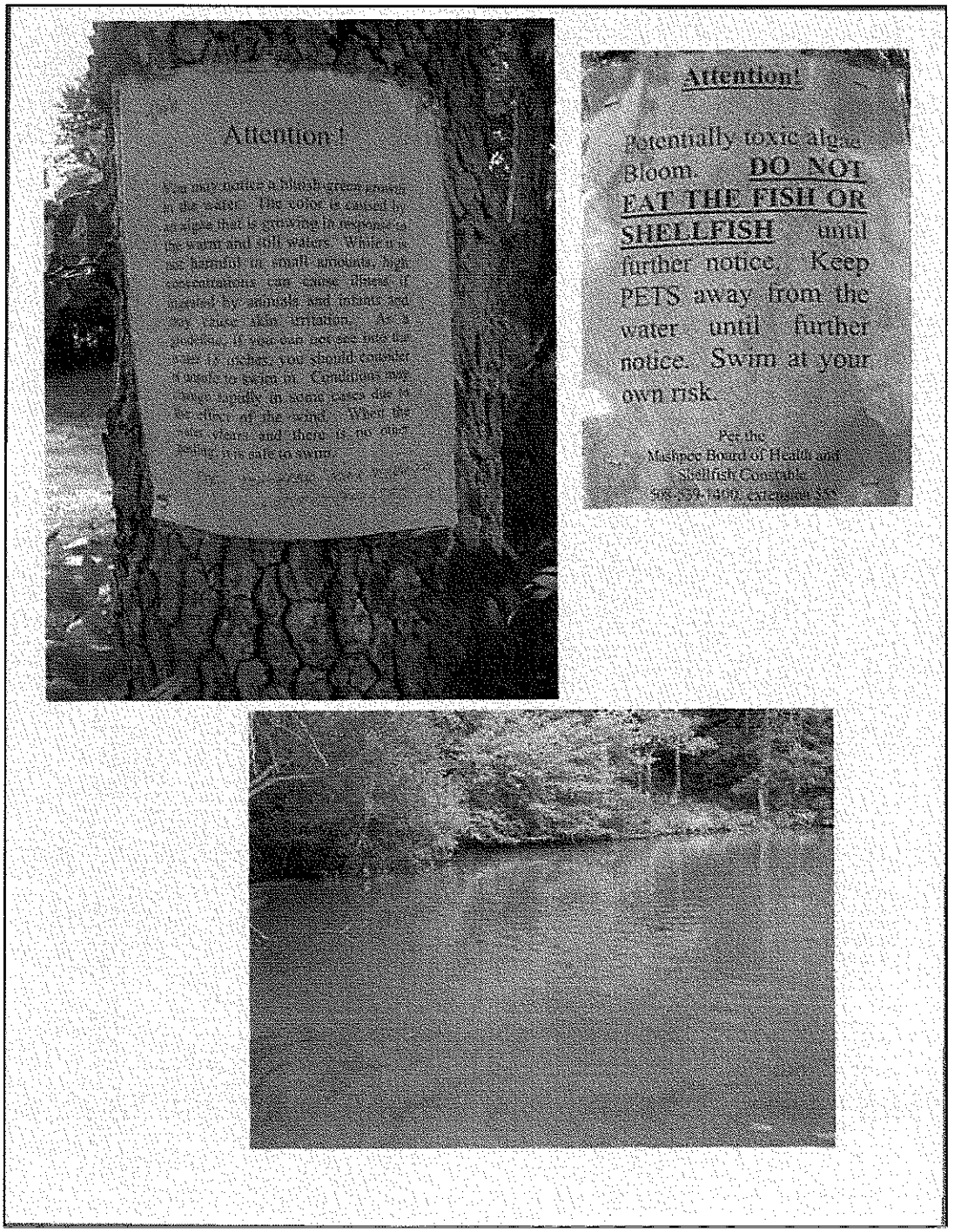
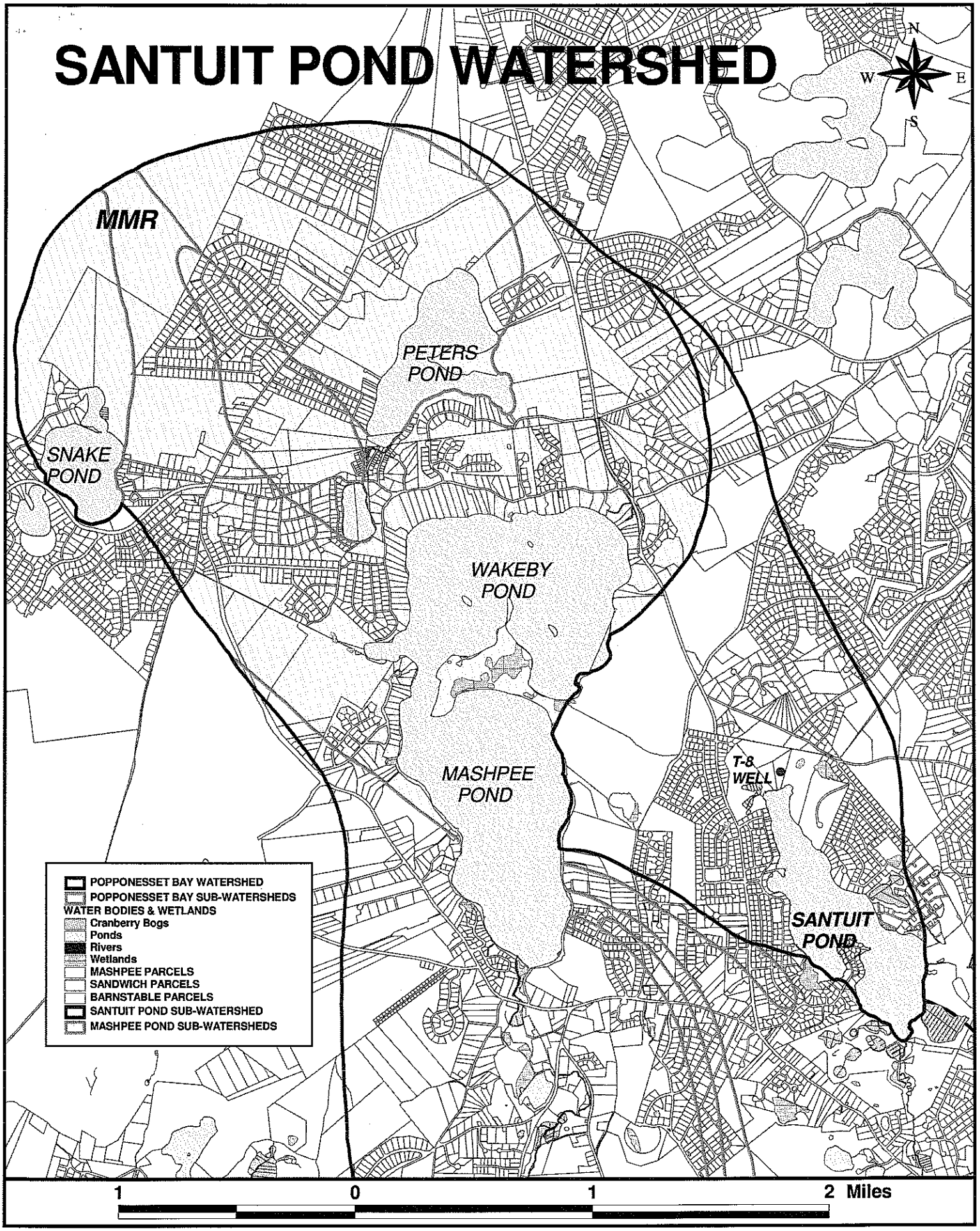


Figure 3
Santuit Pond
Mashpee, Massachusetts


SANTUIT POND WATERSHED
N
W
E
S
MMR
PETERS POND
SNAKE POND
WAKEBY POND
MASHPEE POND
T-8 WELL
SANTUIT POND
POPPONESSET BAY WATERSHED
POPPONESSET BAY SUB-WATERSHEDS
WATER BODIES & WETLANDS
Cranberry Bogs
Ponds
Rivers
Wetlands
MASHPEE PARCELS
SANDWICH PARCELS
BARNSTABLE PARCELS
SANTUIT POND SUB-WATERSHED
MASHPEE POND SUB-WATERSHEDS
1 0 1 2 Miles

Natural Resource Damages Fund
Groundwater Restoration Projects
Textron Systems Corporation/Mass Military Reservation Superfund Site

TOWN OF MASHPEE
GRANT OPPORTUNITY INFORMATION

BUDGET NARRATIVE

ENSR Corporation has provided a cost estimate for the Santuit Pond Diagnostic Study Project. ENSR is proposing a cost of $58,825 for their services with a task-specific breakdown as noted below:

1. Data Review and Kickoff Meeting	$3,700
2. Field Surveys	$20,350
Analytical Costs	$6,800
3. TMDL Analysis	$6,250
4. Diagnostic Summary Report	$9,350
5. Meetings and Communcations	$4,650
6. Wet Weather Sampling	$4,250
7. Cranberry Bog Sampling	$3,075
Project Total	**$58,825**

We asked our consultant to provide a budget analysis, the result of which is as follows:

The following are critical assumptions to support the proposed cost. These assumptions are provided to identify activities or tasks which have an important influence on overall project performance. Should the critical costing assumptions not be met, ENSR will reserve the right to revisit and re-cost the impacted activity.

1. ENSR assumes reasonable and safe access and mobilization to Santuit Pond.

2. ENSR will contact the MA NHESP regarding the potential presence of endangered species within the Santuit Pond basin, but will not inventory biota other than mussel presence/absence observations during underwater sediment and vegetation mapping.

3. ENSR will not delineate wetlands nor conduct finfish surveys under the proposed scope of work.

4. ENSR will conduct no field activities unless they can be conducted under conditions that meet Health and Safety requirements.

5. The Draft Diagnostic Summary Report will evaluate potential pond restoration techniques, estimate approximate costs, and permit requirements. However, this scope of work does not entail environmental permitting.

6. ENSR will incorporate one round of comments from the Mashpee Selectmen, Conservation Commission, other municipal departments, state agencies, and interested stakeholders and finalize the Diagnostic Summary Report. The final Diagnostic Summary Report will be provided as 3 hard copies, an electronic version, and a downloadable PDF file.

TEXTRON/MMR NRD FUNDING ALLOCATION BY FISCAL YEARS [1]

PROJECT TITLE:	Santuit Pond Diagnostic Study			
APPLICANT NAME:	Town of Mashpee			
EXPENSE CATEGORY	FISCAL YEAR 1	FISCAL YEAR 2	FISCAL YEAR 3	FISCAL YEAR 4
	Textron/MMR NRD Funds	Textron/MMR NRD Funds	Textron/MMR NRD Funds	Textron/MMR NRD Funds
A. SALARIES				
B. EMPLOYEE BENEFITS				
C. CONTRACTED SERVICES	$58,825			
D. SUPPLIES, MATERIALS AND EQUIPMENT				
E. TRAVEL				
F. OTHER (LIST)				
G. OTHER (LIST)				
TOTAL BY FISCAL YEAR	1 $58,825	2	3	4
GRAND TOTAL (sum of boxes 1+2+3+4) [This sum is the total NRD fund request]	$58,825			

[1] The fiscal year is July 1 – June 30. If the proposed project will be completed in one year, fill in only the column titled "Fiscal Year 1."

TEXTRON/MMR NRD PROJECT BUDGET SUMMARY BY TASK AND FUNDING SOURCE

PROJECT TITLE:	Santuit Pond Diagnostic Study							
APPLICANT NAME:	Town of Mashpee							
TASK[2]	TEXTRON/MMR NRD FUNDS		OTHER CONTRIBUTIONS				TOTAL COST BY TASK	
			COMMITTED		NOT COMMITTED			
A. Performance of contracted Santuit Pond Diagnostic Study by ENSR	$58,825						$58,825	
B.								
C.								
D.								
E.								
F.								
G.								
TOTAL BY FUNDING SOURCE	5	$58,825	6		7		8	GRAND TOTAL $58,825

[2] The listed tasks should correspond with information provided in the Project Narrative.

THE TOWN OF MASHPEE AND THE TOWN OF SANDWICH

March 5, 2009

Ms. Karen Pelto
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Subj.: Natural Resources Damages Fund--Textron Settlement
Re: Letter of Support for the NRD Grant Applications from Sandwich & Mashpee

Dear Ms. Pelto,

We, the Towns of Mashpee and Sandwich, are writing this joint letter to express our mutual support for each others' proposals for funding under the Natural Resources Damages (NRD) Grant program. We believe these two proposals are complementary in nature, and demonstrate the regional effort that is required to solve water resource problems across political boundaries.

The Town of Mashpee's proposal is to conduct nutrient loading studies for Santuit Pond. Santuit Pond is a 164-acre shallow groundwater-fed pond that is located near the Sandwich/Mashpee town boundary. The pond suffers from the input of high levels of nutrients and is listed in the "Massachusetts Integrated List of Waters" in Category 5 (Waters Requiring a TMDL). The Town of Mashpee wants to characterize and quantify nutrient inputs to the pond, propose an appropriate TMDL, and recommend remedial activities. Most of the nutrient input to the pond comes from land use activities in Sandwich.

The Town of Sandwich's proposal is to develop a Comprehensive Water Resources Management Plan. This plan will allow Sandwich to develop a firm understanding of all of its water resource needs, and the best remedies to address those needs. It will protect all of the Town's water resources, including those shared with its neighbors. The Plan will specifically identify ways to reduce the nutrient loadings from areas of Sandwich that are upgradient from Santuit Pond.

We believe that the complementary nature of these two projects is very clear. Sandwich's work is important to understanding and ultimately controlling the nutrient loading to the pond, and Mashpee's estimate of nutrient load limits for the pond will provide important input to Sandwich in its water resource planning. Each needs the other to protect the Santuit Pond, and other shared resources.

Finally, we believe that Sandwich's proposed Comprehensive Water Resources Management Plan is vitally important to the continued efforts of both communities to protect our shared water

resources. In addition to a number of ponds like Santuit Pond, Sandwich and Mashpee share watersheds that affect Popponesset Bay and Waquoit Bay East. Because these embayments are located in Mashpee, Mashpee began the effort to protect them by developing its comprehensive water resource management plan earlier this decade. However, to continue to stay on schedule, Mashpee now needs Sandwich to begin its planning efforts so both communities can arrive at joint solutions to protect these resources.

Each Town supports the other Town's proposal as appropriate and worthy of funding. We hope the EEA can recognize the complementary nature of these the two important projects and award them both.

Sincerely yours,

Joyce M. Mason, ***Town Manager***
Town of Mashpee, MA

George Dunham, ***Town Manager***
Town of Sandwich, MA

THE TOWNS OF UPPER CAPE COD
BOURNE, FALMOUTH, MASHPEE, SANDWICH

March 2, 2009

Karen Pelto
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: Support for Textron NRD Grant Requests of Upper Cape Municipalities

Dear Ms. Pelto:

On behalf of the Boards of Selectmen of the four Upper Cape municipalities – Bourne, Falmouth, Mashpee, and Sandwich – we, the Chairmen of the respective Boards of Selectmen, would like to express our unanimous support for the grant requests being submitted by our towns for the Natural Resources Damages (NRD) funds from the recent Textron settlement.

In short, it is our firm belief that the requests of the four Upper Cape towns should be supported and funded before any requests submitted by other governmental and non-public agencies are considered. No other applicants have been impacted as directly by the Textron contamination, nor are other applicants able to provide the type of services that we can directly to Upper Cape residents. Additionally, based on the extremely difficult financial circumstances in which we all find ourselves, municipalities need these funds more than ever to help address the environmental issues identified in our respective grant applications. Without the NRD funds, we would not be able to complete these projects.

Again, we strongly feel funding should be approved for the Upper Cape municipalities before any other grant requests are contemplated or approved. Thank you for your consideration of our input and please do not hesitate to contact us if you have any questions.

Sincerely yours,

Stephen F. Mealy, Chairman
Bourne Board of Selectmen

Ahmed A. Mustafa, Chairman
Falmouth Board of Selectmen

John J. Cahalane, Chairman
Mashpee Board of Selectmen

Linell M. Grundman, Chairman
Sandwich Board of Selectmen

CAPE COD COMMISSION
3225 Main Street
PO Box 226
Barnstable, MA 02632
(508) 362-3828
Fax: (508) 362-3828
frontdesk@capecodcommission.org

March 9, 2009

Karen Pelto
EEA NRD Case Manager
MA Office of Energy and Environmental Affairs
Natural Resource Damages Assessment and Restoration Program
100 Cambridge Street, 9th Floor
Boston, MA 02114

Dear Ms. Pelto:

I am writing to express my support for the Falmouth and Sandwich NRD grants for Comprehensive Wastewater Management Planning and the Town of Mashpee's request for Santuit Pond. Wastewater planning on Cape Cod is targeted at restoring the water quality of impaired coastal embayments due to widespread use of septic systems that release nitrogen into the groundwater. Improving the health of our embayments begins with the restoration of groundwater quality through the provision of wastewater infrastructure. This will also provide water quality benefits to drinking water supplies and fresh water ponds. Santuit Pond is one of the more eutrophic fresh water ponds on the upper Cape and grant support to better delineate its condition is an important aspect of the collective wastewater planning that is anticipated.

Because we live on a sole Source Aquifer and our watersheds cross town lines, the local Comprehensive Wastewater Management Planning effort is also an important regional effort.

I hope that the Natural Resources Damages Program will fund these proposals.

Please contact me if you have any questions.

Sincerely,

Paul Niedzwiecki
Executive Director

Cc: Bud Dunham, Sandwich
Joyce Mason, Mashpee
Robert Whritenour, Falmouth
Tom Guerino, Bourne